vitation issued by the committee of the section." The recommendation of the committee was adopted, and on motion the council resolved further that it regards with especial favor holding all sessions under the joint auspices of the section and the appropriate affiliated society.

2. A resolution was adopted as follows:

WHEREAS serious injury and injustice would be done to scientific societies and scientific journals should such societies be forbidden to send scientific journals to members by second-class postage,

Resolved, that the American Association for the Advancement of Science, meeting in Minneapolis, request the Postmaster General and the Committees on the Post Office of the Senate and the House of Representatives to give careful attention to the effects of any ruling of the department that might limit the advancement and diffusion of science in this country.

Resolved, that copies of these resolutions be sent to the Postmaster General and to members of the Committees on Post Office of the Senate and the House of Representatives.

The officers of the association were instructed, officially and in the name of the association, to take such steps as will aid in the passage of the Dodds bill.

3. The election of fellows of the association was placed upon the basis of professional work in science, in the hope that greater uniformity will thus be secured in the action of sectional committees.

4. The usual grant of $200 was given to the Concilium Bibliographicum, and an additional grant of $75 to Professor G. J. Peirce for continuing the study of organisms in brines.

The general committee voted to hold the next meeting of the association in Washington from December 27 to December 30, and to reaffirm the action contemplating meetings in Cleveland and Toronto for 1912 and 1913 respectively. The following officers were chosen for the Washington meeting:

President—C. E. Bessey, University of Nebraska.

Vice-presidents—Section A, Mathematics and Astronomy, E. B. Frost, Yerkes Observatory; Section B, Physics, R. A. Milliken, Chicago University; Section C, Chemistry, F. K. Cameron, Department of Agriculture, Washington; Section D, Mechanical Science and Engineering, C. S. Howe, Case School of Applied Science; Section E, Geology and Geography, Bohumil Shimek, University of Iowa; Section F, Zoology, H. F. Nachtrieb, University of Minnesota; Section G, Botany, F. C. Newcombe, University of Michigan; Section H, Anthropology and Psychology, G. T. Ladd, Yale University; Section I, Social and Economic Science, no election; Section K, Physiology and Experimental Medicine, Dr. W. T. Porter, Harvard University; Section L, Education, E. L. Thorndike, Columbia University.

General Secretary—John Zeleny, University of Minnesota.

Secretary of the Council—T. S. Palmer, Washington, D. C.

FREDERIC E. CLEMENTS,
General Secretary

SECTION A—MATHEMATICS AND ASTRONOMY

As the Chicago Section of the American Mathematical Society held its regular Christmas meeting in affiliation with the American Association, the special program of Section A did not include any technical mathematical papers. The "general interest session" of the section was held on Wednesday afternoon. This was a joint session of the Chicago Section of the American Mathematical Society and of Section A, and the program of the session consisted of the vice-presidential address by Professor E. W. Brown, of Yale University, and the papers by F. R. Moulton and E. B. Frost, of the University of Chicago.

A very interesting feature of the meeting was the joint session of Sections A and D and the Chicago Section of the American Mathematical Society. This session was devoted to the report of the committee of twenty, appointed at a similar meeting in Chicago, in December, 1907, on the question: The teaching of mathematics to students of engineering. During the evening preceding this meeting members of Sections A, B and D and the Chicago Section of the American Mathematical Society discussed informally questions relating to this report and were afforded excellent opportunities to become better acquainted.

In the absence of their authors the papers by J. E. Siebel and H. E. Wetherill were read by title. The papers by J. A. Parkhurst and Percival Lowell were read by E. B. Frost and Frederick Slocum, respectively. All the other papers of the

following list were read by the authors during the three sessions of Section A.

1. "The Relations between Jupiter and the Asteroids" (vice-presidential address), E. W. Brown.

2. "The Contributions of Astronomy to Mathematics," F. R. Moulton.

3. "On some possible Bases for the Spectral Classification of Stars," E. B. Frost.

4. "Apparent Photographic Star-streams and their Relations to some of the Vacant Regions of the Sky," E. E. Barnard.

5. "Photographic Observations of the Surface of the Planet Mars," E. E. Barnard.

6. "An Integrable Case in the Problem of three Bodies," W. D. MacMillan.

7. "Photographic Position of 127 Stars within Ten Minutes of the Ring Nebula of Lyra," F. P. Leavenworth.

8. "Preliminary Report on the Evidences of Circulation in the Atmosphere of the Sun, Derived from the Study of Solar Prominences," Frederick Slocum.

9. "On the Choice of Standard Stars in Photographic Stellar Photometry," J. A. Parkhurst.

10. "The Oblateness of the Earth," J. E. Siebel.

11. "Dials for Calculations," H. E. Wetherill.

12. "Parallax of Ring Nebula of Lyra from Photographs taken at the Lick Observatory," B. L. Newkirk.

13. "Spectrum of Ring Nebula of Lyra," K. Burns.

14. "The Sun as a Star," Percival Lowell.

The addresses by E. W. Brown and F. R. Moulton will appear in SCIENCE. Abstracts of the other papers follow, the numbers preceding these abstracts correspond to the titles in the list given above.

3. There are numerous possibilities in the selection of a basis for the establishment of a system of stellar classification according to spectra. Emphasis may be laid upon the differences of a physical sort between stars, such as temperature, as inferred from the extension of the spectrum toward the violet, or from measurements of the radiation at different wave-lengths or differences of a chemical sort may be made the criterion, according to the elements found in the spectra. Again, theoretical reasons based upon the dynamics of the case may be regarded as especially important; or deductions from some hypothesis of stellar evolution may be considered as the most logical basis for discrimination. Even the motions of the stars, or the space within which they are found, may have a bearing upon the subject, as, for instance, in the case of the streams of stars recently discovered and lately much discussed.

The paper gives a brief general discussion of some of these points, with lantern illustrations of different celestial spectra.

4. There are frequently seen, on wide field photographs of the sky, lines of stars either straight or curved, and sometimes in the form of more or less complete ellipses with a brighter star in a focus of the ellipse. It is probable that most of these stars are not physically connected, and appear so only by perspective. But it does not seem probable that all these appearances are due to fortuitous circumstances alone.

Besides these lines and curves of stars, so striking in some parts of the sky, there are apparently broad streams of stars which seem to have a common trend. This appearance usually occurs in a very dense region, and resembles that which might be produced by the sweep of a giant broom. In some cases these "sweeps" are apparently connected with vacant regions, as if there were a common drift of the stars away from these places. A striking case of this kind occurs in *Scutum*, where the appearance is that of streams of stars diverging away from or converging to a vacant region at this point.

5. During the opposition of Mars in 1909 efforts were made to secure photographs of its surface features with the 40-inch refractor and a negative enlarging lens made by Brashear. For this purpose a yellow color screen, made especially for the work by Mr. Wallace, with Cramer instantaneous isochromatic plates, was used. Though the exposures were short (three or four seconds), it was found necessary to guide on the planet during the exposure. In the eyepiece of the long-focus (61½ feet) guiding telescope two cross-wires (spider threads) were inserted. In making the photographs the polar cap of the planet was bisected by these cross-lines, and the telescope held firmly in this position by pressure exerted at the eye-end of the 40-inch. The cross wires are on a perforated strip of sheet brass (with an opening a couple of inches in diameter) that can be shoved back and forth through a slit in the adapter carrying the eyepiece. It is also arranged to move in position angle.

For photographing Jupiter and Saturn, where there is nothing definite to guide on, the intersection of the wires can be made to bisect a satellite, after the image of the planet has been

properly adjusted in the camera. The wires are then held firmly on the satellite, as in the case of the polar cap of Mars.

The conditions of seeing necessary for success in this class of work were almost entirely absent during the opposition of Mars. There was only one night, 1909, September 28, on which the conditions were favorable, and this for a short time only. The best results are therefore meager, but the promise of success is good when conditions will permit the best work.

The photographs of September 28 show the region of the Syrtis Major. They contain essentially all the details that could be seen with the same telescope visually.

6. Dr. MacMillan shows that if two of the masses are finite and equal and revolve about their common center of gravity in circles, and if the third mass is infinitesimal and is projected in the axis of revolution of the two finite bodies then the motion of the infinitesimal body can be determined by means of elliptic functions. If the velocity of projection is not too great the motion of the infinitesimal is periodic and it is shown how to construct periodic series representing the motion.

7. Twenty-two photographs were made with the 10½-inch telescope of the University of Minnesota between the years 1897–1910. Ten plates were measured and reduced to standard of October 19, 1909. The faintest stars measured were about fourteenth magnitude. No variability in brightness was detected. The proper motions are all less than $0''.1 \pm 0''.01$ per year. The measures have not yet been discussed for parallax.

8. From a study of 3,300 solar prominences, by Dr. Slocum, photographed in the light of the H-line of calcium with the Rumford spectroheliograph of the Yerkes Observatory during the past seven years, 1,100 were found which by their shapes or movements indicate a horizontal circulation. The tendency is poleward between latitudes 20° and 55°, equatorward beyond 55°, and neutral near the equator. The contrast of tendency is greater in the northern hemisphere than in the southern in the ratio of 2 to 1. The average height above the chromosphere of the prominences studied is 0′.7 or 30,000 km. The earlier plates do not afford data for determining velocities. From the later plates low prominences of the cloud type give apparent velocities from 1 to 10 km. per second. One detached cloud at a height of 7′ or 300,000 km. shows a horizontal velocity of 50 km. per second, while eruptive prominences have been observed the north and south horizontal component of whose velocity reaches 200 km. per second.

9. The paper by Mr. Parkhurst deals with the relative advantages of two proposed systems of standard magnitude stars; those in the neighborhood of the pole, and the white stars in the particular region photographed. It compares the possible errors arising from differences of transparency of the sky wnen a distant region is referred to the polar standards with the errors due to the magnitudes of stars found in the visual catalogues of the region photographed, and the uncertainties due to the allowance made for spectral type of these standards.

10. In accordance with experimental demonstrations devised by Dr. Siebel, the ellipticity of the earth may be considered as the result in part of the withdrawal of a greater amount of kinetic energy in one of the three directions (in which the molecular motions of a liquid subjected only to its own internal forces may be resolved) during its congelation or solidification. For the experimental demonstration of this phenomenon a drop of water is suspended in a mixture of Beechwood Creosote and ether, which is cooled sufficiently to make the drop of water congeal almost at once. The moment when this takes place, the perfect globular shape of the drop changes into an ellipsoidal form, whereby the vertical diameter of the same is reduced at least one fourth; the now solid and flattened drop, on account of the lower density acquired, rises slowly to the surface.

11. A particular kind of dials useful in certain calculations were discussed in the paper by Dr. Wetherill.

12. The present investigation is based on measures of seventeen plates made with the Crossby reflector of the Lick Observatory. It proves impossible to separate the parallax from atmospheric dispersion without further observational material which the Lick Observatory will provide. In addition to masking the effect of parallax the atmospheric dispersion produces shifts of the position of the central star amounting to $0''.2$.

Photographs made with a reflector are probably more subject to the effects of atmospheric dispersion than those made with a refractor.

Certain hitherto unexplained discordances in visual observations of the central star may be due to dispersion.

13. True photographs of the nebula were taken with the slitless spectroscope of the Crossby

reflector of the Lick Observatory. Spectrum on the stained plate was compared with spectra on ordinary plates. The spectrum of central star is continuous and like spectra of central star of planetary nebulæ. The spectrum of central star is relatively stronger in ultra-violet light than the bluest of the Orion type of stars. The distribution of elements in the nebulous ring are probably not identical.

14. The conclusions reached in the paper by Percival Lowell are: That parallaxes beyond 0″.067 are too small to be trustworthy, and that the masses of those stars for which alone we have dependable data are, in the mean, almost exactly the same as that of the sun.

The following members of Section A were elected as fellows: M. J. Babb, E. W. Bass, H. Y. Benedict, G. D. Birkhoff, A. B. Chace, Arnold Dresden, Eric Doolittle, J. C. Duncan, T. C. Esty, Max Fischer, G. W. Hartwell, H. G. Keppel, A. S. Hawkesworth, T. H. Hildebrandt, N. J. Lennes, W. H. Maltbie, Max Mason, Helen A. Merrill, E. J. Miles, A. B. Pierce, A. R. Schweitzer, F. H. Seares, Mary E. Sinclair, Clara E. Smith, E. R. Smith, A. W. Stamper, A. L. Underhill, C. E. Van Ostrand, F. W. Very, W. D. A. Westfall, E. J. Wilczynski, F. B. Williams, T. W. D. Worthen, E. I. Yowell. The section elected President E. O. Lovett member of the council, President C. S. Howe member of the sectional committee, and Dean H. T. Eddy member of the general committee. On recommendation of the sectional committee Professor E. B. Frost, director of the Yerkes Observatory, was elected chairman of the section.

G. A. MILLER,
Secretary of Section A
UNIVERSITY OF ILLINOIS

SOCIETIES AND ACADEMIES

THE BOTANICAL SOCIETY OF WASHINGTON

THE 68th regular meeting of the society was held at the Cosmos Club, Friday, December 16, 1910, at eight o'clock P.M. President W. J. Spillman presided. Thirty members were in attendance. H. A. Edson, E. P. Humbert, F. J. Pritchard and W. H. Long were admitted to membership.

The following papers were read:

Propagation of Sea Island Cotton: Dr. W. H. EVANS.

An account was given of the work of the Hawaii Agricultural Experiment Station with cotton, especial attention being called to the vegetative propagation of the cotton plant. At the Hawaii Station experiments with Sea Island and Caravonica cottons have been in progress for several years, and it has been found advantageous to grow them as perennial crops, pruning the plants every year, the Sea Island to about six or eight inches of the previous year's growth and the Caravonica about one half the growth of the season preceding. After pruning, the plants start growth rapidly and within five months are producing squares. By paying attention to the time of pruning, harvesting can be regulated to come at a time when picking can be most economically done. In the experiments described above, the prunings have been taken as cuttings, rooted, and then set into the field. In this way a number of superior strains have been propagated without the possibility of crossing. As the older plants yield fifty to one hundred cuttings at a pruning and practically all root quickly, this is not as slow a method of propagating as would be at first thought.

In addition to increasing cotton by cuttings, it has been found possible to propagate it by budding and grafting, and a considerable number of plants have been successfully top-worked with especially fine strains of cotton.

Pecan Scab: M. B. WAITE.

The pecan, being a native forest tree, is not as subject to destructive outbreaks of fungous diseases as other cultivated nuts and fruits. It is native of the Mississippi Valley as far north as Iowa and central Illinois, and extends eastward into Alabama and westward into Texas. It is mainly planted in commercial orchards throughout the cotton belt, but particularly in the district where sugar cane can be cultivated. It is not expected, therefore, that the pecan should have such destructive diseases as the bacterial blight of the English walnut, pear-blight of the pear and apple, yellows of the peach tree, or the black-rot, downy mildew or phylloxera of the European grape when the latter is grown in the eastern United States.

There is an apparent exception to this in the pecan scab, caused by the fungus *Fusicladium effusum* Winter. This exception comes about through the transfer of seedlings and horticultural varieties, such as San Saba and Sovereign which originated on the western limit of the pecan in Texas, where the summers are dry, to the humid conditions of the gulf coast states and the Carolinas. The Texas group of varieties are